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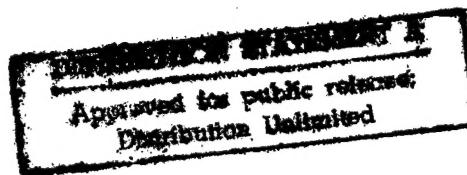
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12 September 1985

**EAST EUROPE REPORT
SCIENCE AND TECHNOLOGY**

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BULGARIA

MENTAL HEALTH PROBLEMS, TREATMENT METHODS SURVEYED

Sofia SUVREMENNA MEDITSINA in Bulgarian No 6, 1985 pp 38-47

[Article by A. Zhablenski (Medical Academy, Scientific Institute of Neurology, Psychiatry, and Neurosurgery, Prof Vl. Ivanov Director: "Current Problems of Medical Practice: Scientific and Technical Progress, 'Health for All,' and Mental Health Care Problems in Bulgaria"]

[Text] Part I

The purpose of this article is to contribute to a discussion the moment for which has arrived in Bulgaria, a discussion of mental health care problems and of the development of psychiatry and its related disciplines and health care areas in Bulgaria. It is to be noted at the very outset that the concept of mental health and the problems reflected in it are not identical to the subject and scope of psychiatry but refer to a broader set of phenomena. Although, to paraphrase a well-known saying, we might say that "mental health is too important to be left to psychiatrists," we believe that psychiatry should play and continue to play a leading or coordinating role in study of the problem. However, it cannot perform this role without critical re-examination of its condition and functions and without resolutely overcoming its continuing relative isolation from and lack of contact with the fundamental problems and mainstream of development of health care as a whole.

In this contribution the problems and tasks facing psychiatry and other disciplines and sectors associated with the problem of mental health in Bulgaria are examined from the viewpoint of certain general modern trends typical of the advanced countries, both socialist and capitalist. Since the current stage of erection of a mature socialist society in Bulgaria not merely permits but objectively requires comparison with the best achievements throughout the world (along with attentive study of the errors of other countries), the basic points of reference in the exposition are not only and so much our own past accomplishments and weaknesses as rather the prospects and potential emerging over a period of at least 10 to 15 years into the future, that is, to the date often given as a symbolic turning point, the year 2000.

I. Why Will the Mental Health Problem Become Increasingly Topical?

The very fact that, both elsewhere in the world and in Bulgaria, the broad term "mental health," not always given a sufficiently concrete definition, has acquired citizenship both in scientific language and in popular usage indicates that it covers a whole complex of phenomena making up one of the basic dimensions of human nature and society. It covers not only prevention and treatment of mental illnesses in the narrow sense of the word, but also the possibility of unimpeded development of the personality, of assertion of its full creative and social potential, its stability and "immunity" to pathogenic stress factors, its ability to assume an active position in life and experience satisfaction in the context of harmonious interpersonal relationships. The unquestionable ethical value nature of many of the components of the mental health concept and the conditions of mature socialist society reflect the regular growth in importance of the spiritual needs of society and the personality, after the possibility has been created of increasing satisfaction of material needs.

Psychiatry addresses itself to only one (and perhaps not even the most important) of the aspects of the mental health question. It would be wrong to require it to perform "social engineering" functions, and a clear understanding of this should protect us from errors and enthusiasms. At the same time, owing to the nature of the differentiated sector of health care and medical science, having its own infrastructure and "corpus" of scientific knowledge and practical skills, psychiatry has the natural vocation (at least at a certain stage) of serving as an organizing nucleus in formulating and solving topical mental health problems. The growing social and scientific importance of these problems is due to the following chief factors:

1. We are at present on the threshold of a veritable scientific revolution in study and analysis of the human brain and behavior. The scientific disciplines grouped together under the common designation of neurobiology and neuropsychology today represent one of the most vigorously developing fronts of scientific knowledge. In the decades immediately ahead the practical results of this accelerated development will expand manifold the possibilities of intervening in the intimate mechanisms of nervous activity, consciousness, and behavior, with all the useful effects and risks arising therefrom. It is to be expected that, among other things, the theory and practice of psychiatry will themselves be essentially transformed.
2. The swiftly advancing technologization of medicine necessitates increasingly clear understanding that every area of medicine has a psychological behavior dimension of its own which the traditional "organolocistic" approach is incapable of comprising, and which is also unable to meet the related human needs which are the object of medical treatment. The improvement and large-scale introduction of new technologies in medicine and health care generate new, previously nonexistent psychosocial problems the solution of which is of no less importance than that of the intervention itself. Among the many examples in this connection we will mention only the psychoadaptive and behavioral problems of patients treated

by hemodialysis, the problems of organ transplants, those connected with maintenance treatment of cancer patients, of intensive care wards, of families with chronically ill or disabled children kept alive by modern treatment methods, the psychological aspect of medicogenetic consultation, and others. The solution of such problems cannot be left exclusively to the intuition and humanism of the health care worker; it requires serious scientific research and the application of so-called "soft" behavioral technologies to supplement the "hard" biomedical technologies.

3. Mental health problems arise regularly in each new stage of socioeconomic development. While until recently the problems in the foreground were the consequences of urbanization, industrialization, and migration from the countryside to the city (a higher incidence of neurotic and psychosomatic illness among employees in certain industries, problems of adaptation to the way of life in the city, especially among adult migrants, increase in alcohol abuse and "juvenescence" of such abuse), in the future we can expect problems of a new type resulting from qualitative changes in the nature of work as it is intensified and automated, due to the introduction of computers into the daily work routine and life, with the attendant behavioral and social consequences. Readiness to face such new problems and to prevent negative mental health phenomena will be one of the important factors in successful and integrated introduction of scientific and technical progress.

4. Independently of the growing preventive and therapeutic facilities, mental illness in the narrow sense, i.e., psychoses, neuroses, and other pathological reactions and developments of the personality, mental illnesses of old age and childhood, oligophrenias, etc, and the so-called psychosomatic diseases, continues and will continue to represent a considerable part of the general morbidity of the population, to cause serious economic losses, and to lead to considerable impairment of the "quality of life" of tens of thousands of families and hundreds of thousands of sick individuals in Bulgaria (it must be borne in mind that there are 195,000 more outpatients with mental health problems in Bulgaria than in 1981). To generalize worldwide experience as reflected in a large number of epidemiologic studies of populations demographically and economically comparable to the population of Bulgaria, we may say the following.

The statistical probability that a person selected at random from the total population will at some time in his life develop at least one episode of mental illness is of the order of 20 percent for males and 40 percent for females. In most cases the illnesses are classified as neurotic, depressive, or psychosomatic or as alcohol or drug dependency. The risk of contracting more serious and chronic mental illnesses is about 3 to 4 percent for men and 4 to 6 percent for women (it is around 1 percent for schizophrenic psychoses).

At any given time, between 5 and 10 percent of the total population suffer from functional disorders or some degree of social disability due to neuropsychic injury or disease.

In the developed countries, no fewer than 14 to 15 percent of all persons applying to general health services (a health officer, for example) for help suffer from clinically manifest mental illnesses, often in conjunction with a physical ailment. Objectively speaking, only one-fifth of them require specialized psychiatric treatment. In many cases, however, the health officer is unable to detect the mental illness and treat it properly (typical errors are a diagnosis of "cardiac neurosis" or "nervous stomach," when in reality a state of fear and alarm is present, or the diagnosis of "neurasthenia," when it is a question of depression), and this leads to needless investigation, ineffective treatment, and economic losses.

The aging of the population in the developed countries is accompanied by the observation of a veritable epidemic of degenerative and vascular diseases of the brain accompanied by intellectual and behavioral decline. At an age above 70 the statistical risk of developing dementia exceeds 20 percent. A serious problem in Bulgaria is the very high frequency of cerebro-vascular disease, which leads to neurological and mental disturbances, and there is a trend toward "juvenescence" of the morbidity.

Another epidemic is associated with the neuropsychic consequences of craniocerebral trauma occurring in transportation and production.

In the eyes of society, and of a considerable number of health care workers and management personnel, the conceptions of the nature, prognosis, and curability of mental illnesses are extremely imprecise and pessimistically colored; they lead to dissemination and hardening of a stigmatizing, prejudiced attitude toward the mentally ill which prevents their resocialization and rehabilitation, and in a number of cases even impairs their civil rights.

Even a necessarily cursory survey of the mental health problems which confront society and will continue to confront it indicates the need for intensification of efforts of the complex of scientific disciplines and health care and social welfare sectors whose mission it is to deal with these problems.

Despite a number of positive scientific and practical achievements, in Bulgaria psychiatry as a whole is below the world level from the viewpoints of organization, material resources, prevention and treatment, and scientific progress. This backwardness stands out very clearly if we take as a gage psychiatry's ability to respond to the increased needs resulting from the array of problems indicated above.

During the era of establishment of socialist health care in Bulgaria, psychiatry is truly accomplishing a qualitative leap forward, especially when we take into account the extremely burdensome heritage and backwardness of this sector from the time of the bourgeois state. In the 1950's and 1960's, as a result of the decisive reorganization of psychiatric assistance on the basis of the experience of the USSR, and above all the establishment of a network of psychoneurological outpatient clinics, the basic needs of the population for essential psychiatric assistance were met. Subsequently, however, there was a gap in a number of respects between the new and growing

needs and the potential for meeting them promptly, both because of the limited base and infrastructure potential and because of the insufficient openness of psychiatry as a science, teaching, and clinical practice to what is most topical and necessary, to interdisciplinary problems and approaches, and to the tasks confronting health care as a whole.

The need for closing the gap in question has been on the agenda for some time. As early as 1976 a program was drawn up and adopted for preserving and improving the mental health of the Bulgarian people. This is a document whose formulations of principles and goals meet the most modern standards and have not lost their importance even today. In the current stage, however, we are faced with the need of reviewing this document (and possibly updating it), especially as regards timely formulation of goals and tasks and its transformation into a feasible action program adapted to the general directions of development of Bulgarian health care on the way toward implementation under our conditions and in our context of the resolutions of the Alma Ata conference (1978) and the principle of "health for all by the year 2000," the new statements of Comrade Todor Zhivkov at the February (1985) plenum regarding the speeding up of scientific and technical progress, analysis of previous achievements and weaknesses while further developing and enriching the dispersion principle as the basis of mental health care efforts in Bulgaria, the practice and experience of the USSR and other advanced socialist and capitalist countries, and the expanded possibilities of fruitful cooperation with the World Health Organization.

II. Definitive Trends in Development of Modern Psychiatry

When viewed on a world scale, the condition and development of psychiatry are seen to be far from presenting a uniform picture of prosperity and progress. Even in countries with an economic potential far greater than that of Bulgaria, psychiatry and health care are in a contradictory situation, and in many of the developed countries the basic needs of the population are not met as well as in Bulgaria. Accordingly, the "world level" spoken of in noting the backwardness of our psychiatry is seen to be one not fully reached in any individual country. It rather represents a generalization of individual achievements, successful solutions, and felicitously applied "models" of proven effectiveness.

The two main groups of factors and trends which are now exerting, and will continue to exert, a decisive influence on the role and functions of psychiatry and its allied disciplines associated with mental health problems, on the one hand, is scientific and technical progress, and on the other is the "social mission," i.e., the objectively imposed need for finding new forms of organization of prevention, treatment, and rehabilitation which will increase the effectiveness, accessibility, and acceptability of psychiatric help. The program of the World Health Organization over the last 10 years has been of considerable importance in formulation of new approaches to the social and organizational aspects of mental health on the international scale.

Prospects for Scientific and Technical Progress

Among the basic sciences studying the brain and behavior, the greatest potential importance for the future is possessed by the new methods and discoveries of molecular biology of the nervous system. As a result of application of the technique of DNA-restriction enzymes (endonucleases) and the use of DNA fragments as probes, it will become possible in the next 10 to 15 years to "map" fully the genome of man (containing around 100,000 codons). This will lead to establishment of connected markers for the majority of genetic polymorphisms of clinical importance in man, and subsequently also to their accurate decipherment; this will open the way to primary prevention of a great number of the serious consequences of diseases of the central nervous system. A precursor of this qualitatively new stage in the development of neurobiology was the discovery, through combined use of population epidemiology and molecular genetic methods, of a genetic marker of Huntington's disease (a serious hereditary disease involving neurologic damage, psychotic disorders, and dementia). Discovery of the genetic code for synthesis of neurotransmitters and neuromodulators, the polymorphisms of which are associated with the etiology of schizophrenic and affective psychoses, may be expected to be of cardinal importance to psychiatry. Molecular genetics of the nervous system opens up previously unsuspected prospects not only in study of diseases, but through investigation of the so-called "resistant" genotypes also for understanding the principles of mental health.

Along with the genetic code, the fundamental sciences are faced with the task of deciphering the information code of the central nervous system, something which will bring us close to learning the specific neurophysiological mechanisms of the higher nervous processes and the mind, as well as their disorders. The molecular principles of elementary neural processes (stimulation-suppression, facilitation-habituation) have been discovered over the last decade, and currently the molecular mechanisms of the memory, learning, and the emotions are being intensively studied. One of the areas in which fundamental discoveries are applied the most promptly is that of the new neuropharmacology and psychopharmacology, for which the possibility is created of developing qualitatively new classes of drugs (for example, there is already today talk of pharmacology of the memory and of learning), as well as methods of "addressing" them with absolute accuracy to specific cerebral structures and even individual cells by connecting a therapeutic molecule to a monoclonal antibody.

At a higher level of integration of the cerebral functions, much fundamental research is currently aimed at study of the hemispheric specialization and so-called "modular" arrangement of the neuropsychic apparatus of man. The new findings in this area will be of extremely great practical importance in pedagogy and the psychology of the learning process, and also in treatment and rehabilitation of a number of mental and neurologic illnesses.

Entirely new scientific specializations are arising on the borderline between fundamental sciences, as for example psychoimmunology and psychoendocrinology. The data of these fields reveal the previously unsuspected

degree and precision of control exercised over all physiological functions and the organism (such as the immune processes) by the mind and the central nervous system, and accordingly add a new dimension and meaning to Pavlov's idea of "neurism" and to the concept of "psychosomatic medicine."

Contemporary scientific and technical progress is also leading to the development of radically new diagnostic and research instruments which allow non-invasive penetration of the morphology and metabolic processes of the living human brain. Computerized axial tomography, which is rapidly becoming an everyday occurrence, has been followed by the positron emission tomograph (PET) and nuclear magnetic resonance (NMR). In addition to the possibility of observing the dynamics of the energy exchange of individual regions of the brain, as well as visualization of morphologic structures down almost to the level of the individual synapse, the new techniques provide the possibility of quantitative determination of the number and density of the dopaminergic and serotoninergic receptors in the living human brain, and thereby create prospects for instrumental diagnosis of some psychopathological disorders.

In another area of the spectrum of fundamental approaches to study of neuropsychic activity are the behavioral sciences and epidemiology. The problems of maturing of individual morphologic and physiological subsystems of the brain and the regular, sequential development of the cognitive functions determined by them, and also their modification during various stages of the life cycle are studied by new methods and means of psychology and the psychophysiology of development. Critical paths are thus opened into the early development of the central nervous system (including the intrauterine), whereby the genetic program of ontogenesis opens to an external stimulus certain information channels which are specific exclusively to a given stage of development and which subsequently disappear. The definitive formation of a number of neuron subsystems in the brain is not of itself genetically determined, but rather is carried out under the influence of external stimuli of high potential information value which must act on the central nervous system at a specific receptive moment. This mechanism has been almost fully revealed as regards the optical analyzer, but in this case is governed by a more general principle of development of the central nervous system thorough knowledge of which will have a revolutionizing effect on science and practical life (for example, as regards the rearing and early education of the child or primary prevention of certain mental illnesses assumed to be associated with departures from normal maturing of cerebral mechanisms).

Cognitive psychology, which has to do with the higher cognitive functions of man and consciousness, is developing at a rapid pace. One of the component areas of cognitive psychology is the psychology of creativity. There are natural links between cognitive psychology and study of the problem of artificial intelligence. One of the practical results of the "cross-breeding" of the two fields are the new approaches and programs for study of mentally retarded and autistic children by means of a personal computer.

Along with the research aimed at determining the etiology of individual illnesses (like the example of Huntington's disease cited above), modern

epidemiology of mental illnesses is making fundamentally new contributions to understanding of the significance of psychosocial factors in the pathogenesis and progress of diseases or in the formation of resistance to such disorders. One of the practical results of research of this kind is the currently existing complex of findings and methods associated with so-called protective social systems or "networks" (social support systems, social support networks), the study of which is of great importance for prevention, therapy, and rehabilitation in psychiatry. Another example in the same area is study of so-called life events and their role in the pathogenesis and progress of a broad spectrum of mental and somatic ailments. Prolonged observation and study over several decades of healthy persons and ones exposed to a high genetic risk of disease (for example, siblings of diseased children or adopted children of mentally ill parents), are today the source of unique scientific data permitting determination of the quantitative relationship and specific contributions of "endogenic" and "exogenic" causative factors in various groups of diseases and behavioral abnormalities.

The concise survey presented thus far of the new phenomena and prospects appearing on the "cutting edge" of the sciences of the brain and human behavior indicates the forthcoming new and higher stage of our overall concepts of man. For the first time in the intellectual history of humanity, monistic inclusion of partial scientific theories of phenomena and processes of qualitatively different levels of matter ("from the individual synapse to psychotherapy," in the words of the prominent neurophysiologist E. Kandel) is becoming a reality. The prospects of this scientific revolution disclose a new future for psychiatry and other disciplines associated with mental health problems.

The "Health for All" Concept and the Place of Mental Health Care in It

The concept of "health for all by the year 2000" actively publicized by the World Health Organization was given its definitive formulation and was unanimously accepted by all 164 countries which are members of the organization at the international conference on primary medical assistance held in Alma Ata from 6 to 12 September 1978. In essence and in general outline this concept reflects not only a humanistic ideal but also the main principles of a social program for development of health care throughout the world which is in keeping with the ideological and political principles of socialist health care(*) .

The "health for all" concept should not be understood in oversimplification, in the sense of a utopian desire to eliminate diseases by the end of

(*) The declaration adopted by the Alma Ata Conference states that "an acceptable level of health for all can be reached through more complete rational utilization of worldwide resources a large part of which is currently consumed for weapons and armed conflicts. A true policy of independence, peace, relaxation of tensions, and disarmament can and should free additional resources for peaceful purposes and especially for acceleration of social and economic development in which primary health care should receive its due share as an essential component."

this century (this is not a realistic goal and such is not import of this concept). The basic concept amounts to the feasible task facing every country on the way to rational planning and management of health care of securing for each of its citizens unimpeded access to scientifically substantiated measures and resources for preventing diseases, increasing resistance to pathogenic agents (i.e., "positive" health), and effective treatment and restoration of the ability to work when sickness does occur. The quality of such health service must be commensurate with the achievements of science and the stage of socioeconomic development reached, all citizens being assured of the possibility of leading a "socially and economically productive life," free to the greatest possible extent from disease and disability.

The "health for all" concept defines as a principal method of reaching this goal the building of an integrated and comprehensive health care system, the center and foundation of which must be primary care for the population. The latter should not be understood in the sense of elementary medical assistance. It is primary because it must precede all other health care activities and be oriented toward the fundamental health problems of the local social community. Primary health care includes the following elements: (1) health education of society; (2) rational nutrition; (3) protection of the environment, including the provision of pure drinking water; (4) health care for mother and child; (5) immunization; (6) prevention and control of locally widespread or endemic diseases; (7) effective treatment of the most common diseases and traumas; (8) provision of the most essential drugs. Primary health care is not exclusively a task of health care but of all other sectors at the local level linked to care of man and the environment, such as education, urban development, industry and agriculture, and communications and transportation. The primary health care subsystem should be capable of effectively meeting at least 70 to 80 percent of all the health care and medical needs of the population without referral to more highly specialized institutions.

The subsystems of secondary (specialized treatment) and tertiary (rehabilitation, care of the chronically ill) medical and medicosocial assistance are arranged like concentric circles around the center represented by primary health care. A separate health care subsystem is represented by medical science, in which an especially important place must be occupied, along with development and application of therapeutic and prophylactic technologies, by the epidemiology of contagious and non-contagious diseases and so-called operational research on the effectiveness and quality of health services, and study of needs and public opinion. The administrative subsystem and the information subsystems associated with it perform a coordinating function relative to the system as a whole.

The specific place of mental health care and psychiatry in the overall system as thus outlined will be determined in accordance with the conditions and the capabilities of the individual country. The view advanced by the World Health Organization is that in theory mental health care should cut across the three concentric circles of primary, secondary, and tertiary health care and that the task of rational planning in this regard is to determine which elements and activities should be infiltrated or integrated into each of the three basic levels.

Bulgaria is one of the few countries in the world which have already completed most of their journey toward practical realization of a health care system such as is recommended by the World Health Organization concept of "health for all." This journey is far from over, however, and the question to be resolved is that of definitive harmonization of health care with the full capabilities of the socioeconomic potential achieved by Bulgarian society. The problem of the future of psychiatry in Bulgaria cannot be considered separately from the general strategic courses of development of Bulgarian health care or outside the systematic approach which is methodologically decisive in elaboration of these courses. In discussion of needs and approaches to the future development of psychiatry, psychiatrists will consequently be expected to be not only clinicians but social physicians as well, guided not by "departmental" and narrowly professional interests but by an overall view of the system and its strategy as a whole.

III. Modern Technologies of Mental Health Preservation and Treatment and Rehabilitation of Mental Illnessss

In contrast to the widening skepticism regarding prophylactic and therapeutic possibilities in psychogenic illnesses, the material presence and state of methods and technologies of prevention and treatment do not provide the slightest grounds for pessimism and nihilism. Even without waiting for the practical results of the scientific revolution in study of the brain and behavior, as discussed in the foregoing section, today we have available to us a wide array of means and methods many of which either are not used at all or have been introduced piecemeal, half-way, and only for part of those needing them. Many of these methods are seemingly simple and do not require costly and not easily accessible technical resources. They are, however, "learning-intensive," in the sense that they require precision and high professional competence for their successful application, as well as a high quality of organization and coordination of work.

The examples enumerated in what follows are given to illustrate the existing possibilities of primary prevention (averting the occurrence itself of illness), secondary prevention (elimination, curtailment, or moderation of an illness already in progress, chiefly through timely and effective treatment), and tertiary prevention (preventing the occurrence of social disability and other negative social consequences of disease). The order in which the examples are listed does not reflect ranking by importance; such ranking would rest on a real basis only following the most thorough analysis possible of the specific potential and conditions in a given country.

1. Up to 30 percent of congenital or early acquired encephalopathies (brain damage) leading to mental retardation, abnormalities of character, and neurologic disorders are preventable. A classic example is rubella encephalopathy, which in a number of countries (including Bulgaria) is either disappearing or has already been eliminated by vaccination of all children or young women at the beginning of the reproductive cycle. The majority of affections of the central nervous system caused by the neurotropic morbillous virus are also fully preventable by systematic vaccination of at least 90 to 95 percent of the child population. In the case of genetic or intrauterine neural tube defects, including anencephalias, early intrauterine

diagnosis by the cytologic method (via amniocentesis) or by determination of alpha-fetoproteins in the blood of the pregnant woman is now possible; in the near future even more accurate and less expensive immunologic methods will also be introduced. Prophylactic termination of pregnancy in such cases leads to lowering of the incidence of such ailments. It is possible in the same way to limit the spread of Down's syndrome (still incorrectly called mongolism), one of the most frequent forms of oligophrenia. Since a major known risk factor in Down's syndrome is the age of the parents (not just of the mother, as was assumed until recently), screening of all pregnant women over age 35 and of women pregnant by men over age 45 is an effective prophylactic program.

Cases of so-called "minimal brain damage" due to early and prolonged exposure to the toxic action of small doses of chemicals (lead, metallic mercury compounds, pesticides, and organic solvents) are becoming more frequent under modern conditions. In some countries (England, FRG, Switzerland) legislative steps have been taken to gradually eliminate gasoline containing lead as a major pathogenic agent to which childhood is particularly vulnerable.

2. Neurocerebral traumatism due to transportation and labor accidents is assuming epidemic proportions and annually adds new cases, primarily young persons, to the contingent of patients with mental and neurologic disorders. The obvious preventive measures (use of individual protective equipment such as safety belts and helmets and collective measures to increase traffic and labor safety) are too inadequate in practice to bring about an appreciable decline in morbidity. The causes include typical psychosocial factors associated with education, outlook on life, and self-control, which call for study by psychiatrists and psychologists. It still is not perceived with sufficient clarity, however, that the question of preventing traumatism and traffic and labor safety is also a matter of mental health care.

2. Among all the preventable sociopsychiatric and health problems, the largest scale is assumed by alcohol abuse, which leads to somatic pathology (liver, gastrointestinal, heart ailments), psychiatric and behavioral pathology (characteropathy, psychoses, intellectual deficiency), social pathology and traumatism (accidents, antisocial behavior, physical and psychological mistreatment of the family, especially children), and dysontogenesis (the so-called fetal alcohol syndrome in children of alcohol abusing mothers). Reduction of this pathology by even 25 to 30 percent would have an enormous medicosocial and economic effect on society. Proven resources exist for primary prevention (for example, in Scotland) by developing a broad educational program involving above all health officers, teachers, and families and by applying appropriate economic and legislative measures. Contrary to the widespread notion that prevention should be aimed at "endangered groups," the little success achieved thus far in reducing the frequency of alcoholism on the national or regional scale unequivocally shows that such a result comes about only if a statistically significant reduction of average alcohol consumption is achieved for the population as a whole.

4. Even if we dismiss here the question of drug dependency, which is of limited significance in Bulgaria, we must note the much wider distribution of latent dependency on frequently prescribed psychotropic drugs, chiefly benzodiazepin preparations and soporifics. The syndromes of this dependency are less well known to health care personnel, although they lead to chronic and serious problems. Since in the great majority of cases this dependency comes about iatrogenically (as a result of liberal prescription of "sedatives" in daily clinical and hospital practice), prophylaxis amounts above all to increasing the qualifications of outpatient and clinical physicians as regards psychotropic agents and to strict compliance by every worker and pharmaceutical authority with the WHO recommendations in this area.

5. A factor harming mental health on a mass scale is arterial hypertension and cerebrovascular disease. This is a complex problem in which cardiologists, neurologists, and psychiatrists are now predominantly passive recipients of already damaged cases. Effective solution depends above all on following active, generally healthy behavior, correction and elimination of behavioral risk factors (tobacco smoking, nutritional habits, hypokinnesia), correction of hypertension in its initial stages, and behavioral "reprogramming" of persons at increased risk, along with use of modern methods of individual and social psychology, and work with the family and with the mass information media.

6. Properly conceived interventions applied on a large scale in childhood have a prophylactic effect on emotional (neurotic) and behavioral disorders in children. As cohort studies have shown, this effect has even wider-ranging positive consequences on formation of personality traits in adolescence. The most important finding of these studies is the need for continuity of parental care in early childhood and avoidance of institutionalization and hospitalization at this age. Since in many countries, including Bulgaria, children born outside marriage represent a considerable percentage (up to 10 percent) of all births, the question of early adoption and the medicosocial problems associated with it are of vital importance in prevention of emotional and behavioral abnormalities. In addition to the general measures for stabilization of the family, a number of other measures, such as psychogenic evaluation of conditions in children's hospital and educational institutions, psychological and psychiatric consultation in schools, etc, are tasks of the mental health sector of the health care system.

7. Under modern living conditions, a large number of the mentally ill are restored to a more or less normal existence in society, many of them requiring no more than a minimum of medical observation or outpatient control. An even larger number of persons with slight or episodic mental disorders do not receive specialized or outpatient treatment at all. In both groups symptoms of acute social maladjustment may occur in stress situations, abrupt changes in the daily routine of living, recurrent physical ailments, or other factors. Aggravation of the symptoms, antisocial behavior, or suicide attempts are possible (the latter also occur in persons with no mental illness in the narrow sense). A suitable form of therapeutic and prophylactic response in such situations is crisis intervention as

a specialized method of psychiatric first aid on the spot whenever it is required. Crisis intervention aims at resolution and control of the situation before it leads to undesirable psychiatric and social consequences and without resort to hospitalization, which may have an adverse effect in such cases.

8. Today we have effective and differentiated methods of secondary prophylaxis for a large number of mental illnesses in the narrow sense of the word. These methods do not amount merely to psychopharmacologic treatment but rather represent essentially integrated therapeutic programs, including optimally selected diagnostic criteria, methods of prognosis determination in the individual case, and selection of therapeutic agents in accordance with an individualized profile of biological, psychological, and psychopathological criteria and indicators for periodic evaluation of the effectiveness of treatment. In the case of schizophrenic psychoses, modern secondary prophylaxis aims at rapid control of the symptoms and behavioral abnormalities under conditions of short-term hospitalization (or outpatient treatment whenever such is possible) and early return of the patient to work and family and social life, with or without supporting psychopharmacological treatment. Differentiated diagnosis and prognostic assessment provide the possibility of selecting an optimum treatment program for the individual patient, and also of avoiding insufficiently substantiated therapeutic measures which may have adverse iatrogenic consequences (such as late dyskinesia in the case of mechanically prescribed "supporting treatment"). In the case of affective disorders, we have today a broad spectrum of psychopharmacological agents (tricyclic and other antidepressants, lithium salts, carbamazepine, monoaminooxidase inhibitors, etc); nonpharmacological treatment methods such as modified (unilateral) electroconvulsive therapy, sleep deprivation, and phototherapy; and improved diagnostic methods, which permit precise determination of therapeutic indications for the individual patient with depression and of "responders" and "non-responders" in a given form of treatment. With a large percentage of patients with recurrent affective disorders it is possible to break the cycle of morbidity and secure for the patient (and those close to him) freedom from new attacks as the years go by. Fear and alarm, phobia, and obsessive neurotic disorders, which along with depression represent the most frequent mental illnesses and can disable a patient for a protracted period, can also be successfully treated today with antidepressants, beta blockers, and so-called behavioral therapy (based on the conditioned reflex principle).

9. Tertiary prophylaxis (prevention of social disability, disqualification from occupation and employment and from living independently in society) also has new methods and findings available to it today. Group instruction in "social skills" for daily life (social skills training), so-called "cognitive therapy, and other modern approaches of social psychology to the re-socialization of patients are successfully filling the gaps left by better known rehabilitation methods, which are aimed primarily at restoration of work and occupational skills. It should be noted that the group methods of therapy and rehabilitation in psychiatry represent an effective and economically advantageous form of activity of psychiatric services and are suitable for much broader application than is currently practiced. The experience of a number of leading countries shows that the creation of organized

forms of self-assistance and mutual assistance involving the participation of former patients and members of the patients' families represents a very important therapeutical resource and reserve for provision of psychiatric services.

The examples given in the foregoing of highly effective technologies for prevention, treatment, and rehabilitation illustrate the interdependence and the need for combination of predominantly biological and predominantly psychosocial approaches with predominantly individual and predominantly collectively oriented methods of work. The degree and accessibility of their application, as well as the dimension of the real health care, humanitarian, and economic effect of their application depend on the social fabric into which they are woven and on the principles on which is erected the system of services within the framework of which they are conducted. The urgent task in Bulgaria is proper, scientifically substantiated selection of the essential arsenal of such technologies, their standardization and adaptation to the conditions prevailing in Bulgaria, and provision of the personnel and material resources needed for their wide application.

6115
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CZECHOSLOVAKIA

UNIVERSITIES COOPERATE WITH INDUSTRY

Prague RUDE PRAVO in Czech 24 Jul 85 p 3

[Article by Michal Strida: "Impact of Universities on Theory and Practice"]

[Excerpt] Seven times as many students study at the CSSR universities now than prior to World War II. During the 40 years which elapsed from the liberation of our fatherland by the Soviet Army, almost one million experts graduated from our universities who work in various areas of social practice. A total of 17,639 regular students and 3,373 part-time students completed study at the universities in 1984 alone.

We have already informed our readers about a number of successes achieved in the area of research at universities, but only now, when we see the total results do we realize the immense scope of research at universities. Universities namely train new scientific workers for all sectors of the national economy, science and culture. In the CSR alone almost 4,500 scientific workers are being trained in 180 of the total number of 200 existing scientific disciplines. Pedagogical work at universities must cover the area of almost all scientific disciplines. Because of that, scientific work at the universities' research centers is carried out in all disciplines in which students are trained. Basic research at the universities therefore differs by its discipline structure and thematic comprehensiveness from scientific activity of monothematically oriented centers of CSAV [Czechoslovak Academy of Sciences], SAV [Slovak Academy of Sciences] and ministerial research institutes.

The multidisciplinary nature of scientific research capacities controlled by the ministries of education makes it possible to engage university workers in all types of plan of scientific and technological development. The bulk of scientific research, however, lies in solving the problems of basic research, where the university workers in the CSR account for approximately 25 percent of the total number. They also significantly participate in the state plan for technological development, the state plan for economic research, implement a considerable part of the ministerial plan of health, and deal with the problems of the ministry of agriculture and other ministries. They implement the entire unified plan of ministerial research projects in the area of education. A part of research capacities is used also for the faculty and institute projects.

One of the proofs of the orientation of universities' basic research to the actual needs of practice is the increasing number of inventions. During the 1971-1984 period their total number increased more than 350 percent -- from 76 to 884. The Office for Inventions and Discoveries granted to university workers 15 diplomas for the original scientific discoveries during the last 8 years.

The Advanced School of Chemical Technology in Prague proposed a number of technologies and new chemical materials which have been already applied in practice. Due to the close ties with the production plants it was, for example, possible to start within a very short time production of the veterinary preparation Oestrophan for control of the rutting season. The members of the team headed by Academician J. Mostecky worked out and verified the original method of synthesis of this preparation and within less than 1 year its manufacture started at concern enterprise Chemopetrol-Spolana Neratovice. Cooperation of the university with industry was effectively helped by the new organizational form -- scientific production association. The workers' collective of this association was awarded the Klement Gottwald state prize in 1982 for the successful solution of production technology.

Another example of the direct application of the results of basic research in practice is the new procedure in reducing the volatility of perfumes in soaps and detergents. It was worked out by the worker collective at the Advanced School of Chemical Technology in Prague in cooperation with CSAV. The original solution of perfumes' stabilization was acknowledged with appreciation at the exhibitions of inventions in Paris and Geneva. More than 80 percent of soaps and detergents are manufactured in the CSSR today with this new progressive technology. Licenses permitting its application have been made available also to some capitalist countries. This authors' collective was likewise awarded the Klement Gottwald state prize last year.

The Advanced School of Mining in Ostrava has successfully applied the method of electron zonal refining in the preparation of monocrystals of metals meltable at high temperatures such as tungsten, molybdenum, tantalum and niobium.

The Medical Faculty of the J.E. Purkyne University in Brno has achieved significant results in the reproduction of man. The findings made possible the conception of three children outside the womb. In clinical practice this made possible the introduction of a new method in treatment of infertility. The Medical Hygiene Faculty of the Charles University in Prague has developed an original method for treatment of the infarct of myocardium consisting of the dissolution of inclusions by special substances. The Faculty of General Medicine of the same university produced a telecommunication unit for remote control monitoring (through an ordinary telephone) of the patient who had suffered the infarct of myocardium during the period of convalescence.

Examples of international cooperation are the original instruments for outer space research designed by the Mathematics-Physics Faculty of the

Charles University, Nuclear Faculty and Physical Engineering Faculty of CVUT [Czech Institute of Technology] and Medical Faculty of the J.E. Purkyne University in Brno. Some of these instruments have become part of scientific devices used in the 'Interkosmos' outer space vehicles.

The Faculty of Mechanical Engineering of CVUT in Prague developed under the guidance of professor Br. Chvala the design of the mechanical part of a robot joint (continuously controlled by a manipulator with several stages of tolerance (volnost)). This robot was designed in cooperation with the workers of CKD [Ceskomoravska Kolben Danek] Prague, while the control system was designed by VUAP [Research Institute for Automation Devices] Prague. The manipulator will be used by CKD, railroad car plant Tatra-Smichov in welding of parts for streetcars.

The Faculty of Nuclear and Physical Engineering of CVUT in Prague has put into operation a microtron--an intensive source of gamma radiation manufactured in cooperation with the Unified Institute of Nuclear Research at Dubno near Moscow. This unique instrument is used for analytical purposes in geology, material research and agriculture.

The Radiation Defectoscopy Institute of Institute of Technology in Brno has designed and manufactured a radiation densimeter measuring the relative weight per volume (objemova hmotnost) of concrete. It is used for continuous monitoring of consistency of concrete in the construction of big water works, nuclear power plants, freeways and so on.

The Advanced School of Mechanics and Electrotechnology Plzen developed a programmer for computerized control of the electric furnace. Microprocessor technology was used in its design.

The combined scientific research institute VIT Brno processed under the guidance of docent V. Halek documentation for projection and carrying out of work in the Prague subway which was obtained by the experimental modelling of hydrological conditions along the routes and stations of the Prague subway. During the 1976-1980 period a total of Kcs 167.7 million were saved in the construction of the Prague subway through the application of this research, the results of which are being used also now in the construction of new subway lines. The overall return on the investments in this research project amounts to almost Kcs 16 per Kcs put into research. These achievements were likewise awarded by the CSR national prize.

The Advanced School of Mechanics and Textiles at Liberec in cooperation with the textile industry proposed the method of solidification of roads in the surface mines by means of geotextiles (geotextilie). The use of this material has resulted in savings primarily because the period during which the machinery remains idle when it is transferred from one location to another is reduced. An hour of downtime namely represents a loss of 2,400 tons of overburden or coal. The cost of treatment of 1 kilometer of road by means of geotextiles are only Kcs 240,000, while the cost of building 1 kilometer of road with conventional concrete panels amounts to Kcs 1.2 million. This method proved efficient in the V.I. Lenin surface mines at Komorany in the construction of roads along the conveyors.

In addition to scientific production associations, a more rapid application in practice of the results of universities' scientific research is achieved by the contracts signed by the universities and the most important production plants. Thus for example the contract signed by the faculties of CVUT and plants of VHJ [economic production unit] CKD Prague contributed to finding new methods of measuring and regulation, to the technical solution of product and technological innovations, to the application of computers and microelectronics, to the development of new structural and technological materials.

CKD Kompresory plant cooperates with the departments of the mechanical engineering of CVUT on the problems of through-flow sections of turbocompressors, while the CKD Semiconductors Plant designed in cooperation with other CVUT departments a number of innovated components for automatic control system. Cooperation of CVUT with the CKD plant Electrical Engineering focuses on the development of special measuring methods of rapid and transient phenomena in the motors fed from semi-conductor transducers (menic).

Among the projects already solved is for example the diagnostic testor for streetcars, automation in welding of bodies, investigation of properties of steels for the manufacture of compressors, reduction of machines' noisiness, development of molding mixtures and new technologies in processing of castings.

The implementation of the contract on the other hand helps raise the standard of training and instruction of CVUT students. CKD plants assign the diploma theses to students and make possible practice and excursions for them. This cooperation will further expand during the next 5-year plan. It will primarily focus on the development of modern streetcars, locomotives, diesel engines, semiconductor components, microprocessor control systems, innovation of highway cranes, compressors and other drives as well as on the improvement of equipment for production of building materials.

10501
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CZECHOSLOVAKIA

WORKERS VOICE DISSATISFACTION

Prague HALO SOBOTA in Czech 29 Jun 85 pp 1, 7

[Article by various readers as indicated: "Workers' Word"]

[Text] In Issue No 22 of HALO SOBOTA (1 June 1985) we published a letter by Tibor Kovacik under the headline of "Workers' Word." In the letter the author commented on the conduct of members of two generations of workers, fathers and sons, at the CKD Kompresory Enterprise in Prague (HALO SOBOTA, No 18, 1 May 1985). Both contributions contained a critical view by workers of some negative phenomena and matters in our economic and social life.

The open words expressed by Comrade Tibor Kovacik met with a broad response, as did the positions enunciated by Antonin Mlady and his son, and the words expressed by Stanislav Rak, who operates a horizontal boring and milling machine at the CKD Kompresory Enterprise, and his son.

Today we are publishing the first portion of these comments.

Will There Be More Than Words?

I am convinced that the majority of workers would sign their names to the comments made by Comrade Maly, Rak, and their sons--and not only they. They speak from the heart, they speak the workers' language which everyone must understand, they speak the truth. Young party candidates, who are also from the working class, likewise spoke openly.

I was interested in everything but still something was special. Good and high-quality work and high-quality evaluations connected with it. If you work well it is necessary to remunerate you well, not only financially but with everything the enterprise or the Revolutionary Trade Union Movement has at its disposal. If you work poorly then you must feel it not only in the pay envelope but you are not entitled to any other advantages, for example, recreation time.

Another question is the seriousness and the social standing and value attached to the worker. The above articles refer to this. It is good that we show respect for people with academic titles, officials, foremen, sports personalities, singers, and others. The communications media devote adequate care to

bringing this about. But take, for example, the amount of space they devote to workers (other than words about work) or to topical questions of our life.

That which is written about incompetent foremen cannot be denied. I would add to that which has been said about the handling of people by some foremen that every foreman, no matter what his level, must have one important characteristic: he must be able to counsel people, he must be more clever and more capable than his subordinates and this is true in all sectors. And contact on the part of foremen and functionaries with people and, primarily, workers falls into this particular category. Yes, they can learn a lot from workers, they can find out a lot because, as Comrade Maly says, "they will not learn this from paper" or "how can they know the views of the workers when they spend little or no time among them?" This is a serious question which does not pertain only to workshops and to workers.

I know from personal experience how little time the comrades from the okres committee of the KSC have to visit with communists in the street-level organization. Or what should one think about the fact that the street-level organization invites the representative of the OPBH [expansion unknown] organization as well as a representative of the circuit presidium of apartment dwellers' associations to a public party meeting and nobody shows up or sends their regrets? What is one to think if no one responds to reminders and questions and when inquiries are frequently made by people who grew up with close relationships to the party and to the creation of socialism in this country? We have had a parliamentary deputy who did not visit the voters in our voting district the entire time he was in office. How can he then speak at parliamentary meetings without knowing the views of the people "from below"? The question arises, then, whether he represents his electorate at all?

Finally, I believe that it is a very serious matter which is discussed among people and referred to in both articles. It has to do with school admissions. People (and I am one of them) are convinced that things are not completely in order in this sector; they believe that there is favoritism, bribery, services and counterservices are rendered, just as is the case in this country in other areas of our life. This is one side of the matter; the other side of the coin is to see who actually attends school, primarily advanced schools? I would be very interested in seeing how many children from worker families request admission and how many are admitted? With a few exceptions, I cannot imagine that parents with academic titles would have their children be locksmiths, roofers, cobblers, or that their children would follow some other working class profession. I believe that for such a family this would be a "tragedy."

One could write about many more things. I do not insist that I am 100-percent correct in everything; I have always spoken my mind even when I might have been correct only half the time. It is possible that someone could say that I do not have the right to judge workers' words and to comment on them because I only followed the working class profession for some 26 years and then I went off to "patrol" the state border, to hunt Bandera gang members in Slovakia, etc. Today I am 66 years old and I have been a member of the party for 40 years. But precisely because I am a party member I believe that I must say that which I am thinking.

I thank RUDE PRAVO for allowing workers to speak out and I also favor what Comrade Kovacik said. But currently I also favor that solutions and explanations be found for that which has been said or which will be said in the future (even if the truth will only be one-half or less) so that those who are responsible for and paid for these things would deal with them. I will be most displeased to see everything end only by being expressed and publicized and see nothing further done. (Signed Josef Hozak, Prague)

What Kind of Remuneration for Whom?

I have read the article written by Comrade Kovacik and I fully agree with what he writes. I shall add a few thoughts. Why and how is it possible that a girl working in the office, who does not have her work checked or quotas assigned, can earn more than the girl who has a quota of hoisting thousands of facing tile by hand into a truck bed and if she fails to do so she receives fewer korunas? And the girl in the office earns her money whether she works or does not work. What I don't like is that someone literally slaves and another loafes but sometimes takes home more money than the other person!

In some instances, order is only talked about. Surely, socialism has brought many good things to people and it would be unjust to only condemn everything but why do we have to have so many different institutions? Investigations should be conducted to see whether the pay grades of white-collar workers correspond to their qualifications. Who will go to perform manual work when one earns less than the person who only runs about to meetings?

A whole lot of people have learned only to take. I am not interested in egalitarianism but in a just reward for honest work.

It is high time that quality work should be performed everywhere--in offices, as well as in workshops. I once counted the number of people who are employed in various municipal, okres and kraj organizations. Aren't there too many of them?... If they all did their work well we would have to be a whole lot further along the way than we are.... (Signed Marta Hruskova, Horni Briza)

False Solidarity

That which is written by Comrade Tibor Kovacik is the deep truth and does not require a commentary. I now work as a technician and do not wish to proclaim that technicians always work without making mistakes. On the other hand: there are workers who work two shifts and run home as early as 6 o'clock from the second shift. Controls are so inadequate that neither the foreman nor the timekeeper know anything about this or close their eyes to it because workers are involved.

I know the case of two chaps who, at the expense of the afternoon shift, were able to regularly sit and drink in a restaurant starting at 7 o'clock in the evening. I asked myself--Can a worker under capitalism allow himself to leave the afternoon shift day after day without losing his job? We have a large number of such people, every one of us knows some. Only--let us be honest--we close our eyes out of a false feeling of solidarity. In the majority of

cases, these are people who do not have a good relationship with respect to work and they work only to earn money and do not care whether they do so by honest means. On the other hand, there are workers who love their enterprise and like to work and would never permit such abuses; they subject themselves to socialist morality without any excuses, in a responsible manner and as a matter of course. I expect this all depends on the individual's education within his own family.

Because these abuses occur mostly in Prague and in large cities, I recommend that inspectors not only frequent restaurant establishments during the morning shift, when excessively long periods are devoted to second breakfasts, but also during the afternoon shift. He will see how much work time is wasted in this country! (Signed Jaroslav Kratochvil, Prague)

"I Never Went Along With It"

I, too, was interested in the article entitled "Workers' Word." Much that it contains is true; I also have encountered those who were the subject of Comrade Kovacik's article. Today it doesn't matter whether I work the full 8 hours honestly but what matters is that I am in good standing with the leading workers, that is to say, from the foreman on up. Then I get my pay but I must often close my eyes and be blind to various abuses. By doing so, I can even attain a higher pay category and I will be popular with all, both below and above. We worked piecework but I did not see any "quota sheets." The foreman writes them out, or possibly the party official, what matter if they don't come out right--they'll fix it up in the bookkeeping department so that it will come out right and everybody will be OK, including the bookkeepers, the foreman, etc. Why would people spoil such a comfortable arrangement for themselves, including the party officials and even the chairman of the party organization? Even he is silent and this suits everyone. And the fact that welders are working with electrodes without the use of suction exhaust facilities, this is not even a problem for anybody in the trade unions and that, in their old age, they can become sick--what matter, others will replace them.... In other words, this is a comfortable situation and those who know how to maneuver in it are valued....

But I never went along with any of this. What fights I had and how many drew a sign of relief when illness finally laid me low. Please do not be angry at me but in reading the article by Comrade Kovacik I could not hold back and simply wrote to you. Even if you throw my letter into the wastebasket I will not be angry at you, but I got a load off my chest and that was worth it.
(Signed Vaclav Mikolasek, Litvinov)

5911
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CZECHOSLOVAKIA

RESEARCH ON MINING IN NORTHERN BOHEMIA

Prague RUDE PRAVO in Czech 17 Jul 85 p 3

[Article by Blahoslav Braun: "Safe Extraction of Coal Even in the Foothills"]

[Text] The development of the extraction of coal for the generation of power by large-scale surface mines facilitates a greater yield, a greater degree of economy and greater mechanization of extraction. This method has many advantages, however, it requires substantial changes in the terrain. Technical incursions have affected the area of the most important deposits of power-generating raw materials in Czechoslovakia, the North Bohemia Coal Basin, as well as the adjacent territory of the Krusne Hory Mountains and the central mountain range of Bohemia. The expansion of large-scale quarry-type extraction in the direction of the foothills of the Krusne Hory Mountains has, therefore, raised the necessity of solving this question.

The geological conditions in the North Bohemia Brown Coal Basin beneath the foothills of this mountain range are extremely complicated. Coal seams beneath the Krusne Hory Mountains are of significant magnitude and, thus, they represent valuable coal supplies from the standpoint of the deposits themselves. However, because they are found at considerable inclines this does not contribute to the stability of the territory which is to be disturbed by the extraction process. A particularly dangerous sector lies in the area of the large-scale Czechoslovak Army Mine, involving the southeastern slope of the Krusne Hory Mountains with the Jezerka Peak, where giant rock falls of about 20 million cubic meters occurred already in the distant past. On the slope some rock outcroppings have attained dimensions of several hundred meters and extend 10 or 20 meters above the surrounding slope.

The surface of the basin at the foot of the slope lies at an elevation of 300 to 330 meters. While its average inclination above the surface of the basin amounts to 35 degrees, it rises sharply to as much as 60 degrees below the top of the basin. The 20-meter-thick seam which runs close to the slopes of the mountains is approximately 120 meters below ground level. If this coal is extracted with large machine technology artificial slopes of 200 to 500 meters in height will be created beneath the foot of the Krusne Hory Mountains and,

in places where the mountains have foothills immediately adjacent to the base portion, these slopes would even be larger so that they would attain a height of 800 to 1,000 meters.

For these reasons employees of the Stavebni Geologie Enterprise in Prague have embarked on a difficult task. The main task of the research in peripheral portions of the North Bohemia Brown Coal Basin beneath the mountains is the working out of engineer-geological, geotechnical and hydrogeological documentation for a stable solution and draining of these coal seams. Such a solution, under very unfavorable geological conditions, is quite difficult and is unprecedented in the world thus far. Suitable methods, installations, or procedures do not exist.

In order to support the extensive research work, it will be necessary to conduct some 60,000 meters of core drillings, 3,300 meters of mining operations, 4,500 meters of dug probes and to geologically map some 420 square kilometers of territory. Borings and mining works have already accomplished prescriptive tests, shear tests and special hydraulic pressure tests to determine the magnitude of geostatic tension. An extensive complex of laboratory samples of soil, minerals and underground water has been processed.

The research work is going on in the sector of Komorany with the subsector of Jezeri, Jezerka, Jansky vrch-Jezeri, Jiretin in the mining area of the Czechoslovak Army Mine. Exploration in the area of Chomutov is also being prepared. Any researched procedures are utilized immediately.

The initiation of research work concentrated on the state research task entitled "Stability Problems Involved in Opening Coal Quarries in the Foothills of the Krusne Hory Mountains" was preceded by the working out and critical evaluation of the intentions involved in the plans for solving prospecting and research problems in 1981. The actual work began in 1982 and will be concluded next year.

The principal goal of the task is to determine methods of stability analysis involving extremely high slopes at surface mines. Part of the task is also the solving of methodologies and processing of documentation for stability solutions, both from the standpoint of geologic models through the determination of calculated parameters of the characteristics of soils and rock formations.

The task is divided into three topical groupings. The first is devoted to the development of methods of engineer-geological characteristics of the Krusne Hory rock massif, the second is occupied with the development of methods for determining geomechanical characteristics of the rock massif, primarily involving special field tests and measurements. The third topic involves the development of methods for solving the stability of slopes. It is a logical follow-on of research work into the methods involved in the direct formation of engineering conclusions. The coordination work site is under the control of the Stavebni Geologie Enterprise of Prague. The task is being worked on by a team from this enterprise and also includes other organizations under the jurisdiction of the Czech Geological Office; other research institutes and some advanced schools are also participating in the project.

The most important result to date is a method of slope stability calculations which has already been utilized in the placement of shoring for slopes of the Jan Sverma Surface Mine and in analyzing the stability of slopes in the vicinity of Jezerka. The results, primarily involving developments of a method for determining geological and geotechnical parameters, are regularly transferred to prospecting work.

An additional important and already realized result of research work is a system of controls for monitoring, developed for the Czechoslovak Army Mine in the area of Jezerka. The purpose of this monitoring is to systematically follow the changes in adjacent slopes of the Krusne Hory Mountains, including the granite pillar, and to provide timely warning of a movement of the slope which could have catastrophic results for the mines. This will make it possible for mine operators to make timely use of technical safety devices intended to minimize losses which would arise if the slope slid down.

The system of this monitoring is based on the methods of measuring deformations, both of the surface as well as within borings and in a 470-meter-long gallery pushed into the interior of the rock massif. Additionally, there is a system of seven hydroborings for monitoring the level of groundwaters in individual lithologic layers. The depth of a possible slide area is to be indicated by 14 borings of up to 200 meters in depth which house brittle tape conductors. The shaft tops of all these borings and other tens of measuring pillars and points located on the slopes of the Jezerka are zeroed in geodetically. The stability of rocky cliffs is supplementally checked with inclinometers.

Horizontal shifts in conjunction with depth are measured in 12- to 200-meter-deep borings with an inclinometric probe. Horizontal movement in the prospecting gallery is determined by a tape extensiometer mounted between points which are about 12 meters apart, a device which is duplicated by a six-level wire extensiometer. Altitude changes of points located in the floor of the gallery are measured by accurate leveling.

The results of this monitoring have already been successfully utilized in checking the safety of work in these prospecting works. Measuring results thus far have shown that the entire monitored territory, without regard to the rapid progress of extraction, continues to be stable.

Without a solution to these prospecting and research tasks, the safe opening of surface coal mining operations in the vicinity of the Krusne Hory foothills would not be possible. More than 30 percent of the geological reserves of the North Bohemia Brown Coal Basin lie beneath these foothills. And without mining in this region the life expectancy of the North Bohemia Brown Coal Basin would be substantially shortened.

5911
CSO: 2400/549

POLAND

NEW MACHINE BUILDING INDUSTRY PRODUCTS REPORTED

Transfer Machine Type LSP 493

Warsaw POLISH ENGINEERING in Polish No 2, Mar-Apr 85 p 30

[Text]

The transfer machine type LSP 493 is designed for the simultaneous carrying out of hole drilling operations and cutting of railway rails.

On the above machine rails of a wide range of dimensions can be worked. The spindle speed and feed range make possible the selection of the most advantageous working conditions. The machine has a hydraulic fixing device catching the rail by the bottom part and pressing the rail from the top at both cutting sides. The fixing device is placed on the base inside of which the mechanical chip conveyor is provided transporting chips into a bin.

At one side of the base two 3-spindle drill units with mechanical feed drive are arranged. The operation of these units can be individually switched off. The group of three spindles of a unit can be shifted vertically as well as individually in the horizontal direction. At the opposite side of the fixing device the set with a disk saw is provided. The feed assembly of the above unit

has a hydraulic drive with feed value automatically adapted to the varying load caused by the cross section changes of the rail cut.

The machine has a cooling system with a coolant tank sunk in the foundation under the chip bin. The fixing instrument and guideways of machining units are greased from the central lubrication system.

Upon buyer's request the direction of rail introduction can be changed and the dimension range of machined rails can be widened.

Machine tools of the above type are operating in a number of home plants preparing rail tracks attaining high output and operating very satisfactorily. They are also exported to Czechoslovakia and the German Democratic Republic where they are highly rated by the users. The PONAR-WIEPOFAMA Factory of Special Machine Tools is at present the single manufacturer of the above machine tools in the CMEA countries.

Multipurpose Woodworking Machine DYGA

Warsaw POLISH ENGINEERING in Polish No 2, Mar-Apr 85 p 30

[Text]

The machine finds wide application in furniture and building joinery production. It can be used for almost all operations indispensable at the production of furniture and building joinery in large woodworking plants as well as in repair and service workshops.

In the DYGA machine are combined: a moulder

and circular saw, vertical bobbin-sander, horizontal boring machine and lathe. As an extra equipment the machine can be fitted with an additional grinder for sharpening planer knives and attachment for sharpening milling cutters. The basic unit of the machine is a compact body inside which the headstock with drive is housed.

This assembly is constructed so as to make possible the spindle turn around the machine axis by some 270° . Thus it is possible to use the machine for such joiner operation like cross-cutting and ripping straight or under an angle, milling by means of arbor and shank cutters, sanding, drilling and in-feed milling as well as turning. In addition to the rotary motion the spindle carries out a vertical travel making possible the setting of saving height, positioning of milling cutter at a suitable height above the table or setting of required height in relation to the

boring-milling table.

At the other side of the headstock one can fix a special chuck in a Morse seat making possible work on the boring-milling table running in bearings mounted in rolling slideways and ensuring a smooth shifting of the material worked. Use has been made here of a special protecting system ensuring safe work on the lathe. To facilitate servicing the machine is equipped with auxiliary equipment such as ripping guideway, angular guideway, material clamps, supporting table, milling guideways and lathe arbor bracket.

Programmer-Controlled Milling Machine

Warsaw POLISH ENGINEERING in Polish No 2, Mar-Apr 85 p 30

[Text]

The horizontal, knee-type programmer-controlled milling machine with its own integrated-drive beam is a double spindle unit. One spindle is horizontal and the other - vertical. The FWH-40JP milling machine can be either controlled manually or operates in the automatic sequential cycle with the mini-programmer located in the control stand box. Constructional arrangement of this machine tool has a feature of the universal milling machine, enabling either simultaneous operation of both the spindles or of each spindle separately. Thus, the most economical machining conditions can be selected. Changes of the travel directions at manual control are effected by means of the electric push-buttons, installed on the suspended adjustable control box. Operation in the automatic cycle is programmed directly from the control stand. The program is stored in electronic memory and maintained during 100

hours after the machine supply turning-off. The automatic, space-type segment operation cycle with any sequence enables to machine elements placed in several points of the milling machine table; multi-layer milling in various planes and minimum shifts ranging 0.1 mm. This milling machine is characterized by a very high precision of the machined elements, durability of its assemblies as well as reliability in operation. This machine is provided for machining elements made of various materials, in serialized and mass production.

Working surface of the table is 400x1250 mm, maximum shift of the table: longitudinally 900 mm, laterally 300 mm and vertically 450 mm. The table turning angle is 45° . Rotational speed of the main spindle in the milling head amounts to 56 up to 1800 r.p.m. Installed motor power: main spindle a milling head drive 5.5 kW, feed drive 2.2 kW and electropump 0.125 kW.

High-Output Electroplating Automatic Equipment

Warsaw POLISH ENGINEERING in Polish No 2, Mar-Apr 85 pp 30, 31

[Text]

The programme-controlled MINI electroplating automatic equipment is designed for selective gold, rhodium and tungsten plating of reed relay contacts. The workpieces placed in hangars are automatically transported through all processing stands in accordance with the accepted technology at the maintenance of assumed treatment times. The equipping of the automatic with elec-

tronic control (third generation) makes possible the integration of its units into a dependable whole. It guarantees reliable operation, adaptation ability and controlling of the required production throughput as well as the running of the process in optimum conditions. The time of workpiece resting in gold plating stands is con-

trolled as the function of fed electric charge and can be determined according to the bath efficiency for each stand independently. This ensures the obtaining of coatings of strictly defined thicknesses, considerable gold economy and also the possibility of limiting to the indispensable minimum of the bath volume. In the MINI automatic equipment it is possible to treat details requiring coating of various thicknesses. Due to its semiconductor store the automatic can imple-

ment more than one production process. In the store from a few to a dozen or so programmes can be recorded, according to the complication degree of the process. The equipment has an output of 150,000 contact per 8 hours. The attained coating thickness ranges from 0.1 to 2.5 μm . The MINI is a representative of modern equipment for processing details on hangers, in drums or baskets. It has been awarded a Gold Medal at the last year's Poznań International Fair.

Quadding Machines

Warsaw POLISH ENGINEERING in Polish No 2, Mar-Apr 85 p 31

[Text] Type SG quadding machines are designed for the production of telephone trunk quads with paper-air, styroflex-air or thermo-plastic insulation.

The SG machine with a horizontal arrangement differs basically from traditional "vertical" machines in that the yokes with pay-off bobbins and take-up bobbins rotate only around their own axes while the double haul-off capstan is rotating with a speed of 300 r.p.m. causing quadding of the conductors and winding onto the take-up bobbin. This ensures a much higher output, about three times more than in the case of traditional "vertical" machines. By the use of oblique yokes the rectilinear running of cores from the pay-off bobbins to the twisting points is ensured, eliminating insulation indentations.

The pay-off bobbins of 400 mm outer disk diameter, are bracket-mounted in yoke centres of the pay-off equipment. These yokes rotate around their axis ensuring complete backtwist. Controllers are used to read out and set the tension of individual cores (during standstill or operation of the machine). The quadding machines designed for the twisting of cores in styroflex-air insulation are equipped with an additional rotary yoke for fixing a spool with conductor string, ensuring its complete backtwist.

A special device serves for wrapping the quadded conductor with cotton thread. It is equipped with a gearbox for setting the wrapping pitch. A mechanism ensuring

constant thread tension and a switch stopping the machine in the case of thread breakage or finish. The bracket-mounted hand-off capstan is of a double wheel type. One wheel is solid while the other is provided with a range of grooved rings friction-connected with the hub. The ring friction torque value can be adjusted.

The ENERGOKABEL Research and Development Centre at Ożarów has constructed several types of such machines. In the SG-4 machine the ready quad is directed by a suitable sliding rider and becomes wound on a take-up bobbin, of disk dia. 600 m and width of 315 mm, bracket-mounted on slider shaft.

On the shaft also a continuously operating brake is arranged causing the required quad tension. Correct and uniform layering of the quad on the bobbin is ensured by the rider travel driven from a D.C. motor. Correct travel of the rider and bobbin is ensured by the automatic regulation system.

The SG-6 machine differs from the SG-4 unit by another kind of winder drive and other system of laid pitch regulation on the take-up bobbin. The drive of winder takes place from the main motor via a differential gear and a pair of change wheels. Furthermore, the winder of this quadding machines is foreseen for two bobbins of which one is being filled while the other is removed or prepared for filling. Thus a considerable saving of idle time connected with bobbin change is attained.

Another version represents the SG-65 machines. It differs mainly by other winder solution which is adapted for a take-up bobbin of Ø 630x470 mm. The winder is integrated with a two-wheel hauling machine. The take-up bobbin axis is arranged vertical to the machine axis and the bobbin is fixed in winder body centres. A screw hoist is foreseen for the removal of

a filled and installing of an empty bobbin. The latest model is the SGG-5 machine, an improved and developed version of the SG-6 unit. In addition to a considerable automation degree, reducing the service staff work, the SGG-5 machine is provided with take-up bobbin loading equipment and mechanical equipment for putting on and removal of the take-up bobbin.

Longwall Shield Lining

Warsaw POLISH ENGINEERING in Polish No 2, Mar-Apr 85 pp 31, 32

[Text]

The PIOMA - 27/47 - Oz longwall shield lining has been provided for roof support and control in headings 2.7 up to 4.7 m thick, both horizontal and longitudinally inclined up to 35°, mined with complete roof fall.

The individual sections of the lining are controlled from an adjacent section. One of the numerous advantages of this lining is the possibility of the section transfer, following the advancing longwall face directly behind the mining machine. Owing to this fact, the newly opened roof can be protected. Other important advantages are: its high stability, convenient and large operators' space, easy and simple control, com-

pletely protected (shielded) working area from the roof side and its small weight.

The PIOMA-27/47-Oz longwall shield lining cooperates with the heavy-duty KGS-560 mechanical miner and the RYBNIK 76 conveyor and provides mechanization of the following operations: the section spragging with initial support between the floor and the roof, the roof support with a constant working value, the section with drawing, the section transfer, as well as the drag conveyor transfer.

The principal roof-bar has been equipped with a protractile roof-bar enabling control of the roof opening from the face side.

Latest Model of Motor Vehicle from Jelcz

Warsaw POLISH ENGINEERING in Polish No 2, Mar-Apr 85 p 32

[Text]

The JELCZ C 620 truck-tractor developed by designers from the Jelcz Motor Vehicle Works meets all the technical criteria foreseen by the regulations of the European Economic Committee of the U.N. and CMEA rules. It, therefore, also meets all the contemporary requirements of active and passive safety of travelling. The truck-tractor can be used with a semi-trailer in a set of 36 tons grossweight.

The construction of the vehicle incorporates the latest world trends. Characteristic are: the drive onto the drive axle and trailedd third axle pneumatically lifted and lowered only during travelling with a loaded semi-trailer (to reduce unit ground pressure). When travelling alone or with an empty semi-trailer the truck-tractor's tyres on the lifted axle are not worn while the load on the rear driven axle increases tractive

adhesion and improves vehicle stability on slippery roads.

The spacious and closed cooling system enables the use of the vehicle in dry tropical climate. The dimensions of tractor coupling with the semi-trailer correspond to ISO 1726 standard.

The JELCZ C 620 truck-tractor is foreseen for operation on long also international routes. Hence, the particular attention paid to comfortable driving and convenient work of the driver and its helper. A constructionally new long tilt cab type 134 R is provided. It has a noise suppressing multilayer thermo-acoustic insulation ensuring a very low inside noise level of below 80 dBA (admissible 85 dBA) i.e. on the level of passenger car interiors. The above insulation, together with two highly efficient heating systems (10,000 kcal/h), with forced air blow

and stepless control, ensure the maintenance of a proper interior temperature even at strong frost. The air blown in at disengaged heating ensures effective ventilation in summer time. In extreme cases the ventilation can be improved by lowering the side windows and hoisting of roof flap (3-position control). The cab is equipped with two comfortable wide berths (the upper one foldable) for rest on long routes.

Comfortable armchairs with position and springing control together with the clever location of all levers, grips and pushbuttons, assisted steering wheel clutch and brakes, cause that the driver has ensured a driving comfort nearly the same like a passenger car driver. This results in safer driving. The cab is tiltable under an angle of 60° thus facilitating access to all vehicle elements in the front part of the chassis making possible engine dismantling without cab removal.

Measuring Linear Displacements

Warsaw POLISH ENGINEERING in Polish No 2, Mar-Apr 85 p 32

[Text]

These are instruments with a carrier wave serving for converting output signals of transformer transducers, designed for measuring linear displacements, pressure, force and other non-electrical quantities, into useful measuring signals. The above instruments serve, among others, for operation with such transducers like PTx, PJx, PLx. It is a group of transducers designed for measuring linear displacements ranging from 0.5 to 1000 mm.

With the use of the above instruments it is possible to measure relative static and dynamic displacements, pressure and force. They can also be used for measuring regulation and control within the range of up to 200 Hz in research laboratories and in industry. For static measurements an analogue or digital D.C. voltmeter or writing recorder is to be used. For dynamic

measurements, on the other hand, we use fast-writing recorders, e.g. loop oscillographs. Here are some practical examples of application of instruments with a carrier wave together with transducers:

- measurements of displacement of hydraulic servo pistons
- measurements of linear material elongations, e.g. boiler elongations caused by temperature changes
- measurements of sagging of bridge structures
- measurements of deflection of rocks (in geology)
- control of displacement of drilling equipment
- general application in higher schools for research and didactic purposes
- control of equipment in metal rolling plants, etc.

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POLAND

REPORT ON DOMESTIC TURBINE GENERATOR PERFORMANCE

Warsaw ENERGETYKA in Polish No 5, May 85 pp 207-208

[Article by Jerzy Przybysz, DSc (Eng), Separator Equipment Factory:
"Operation Experience with Domestic Turbine Generators"]

[Excerpts] In late 1984, the total output capacity of generators used in industrial energy production was 25,515 MW, including 2007 MW produced by hydro-power plants. In the past decade, since 1975, this capacity has grown by about 50 percent, but the number of generators has increased just slightly. The increased capacity was obtained mainly through the installation of new 200, 360 and 500 MW units.

Table 1 gives statistics illustrating the distribution of installed capacity in industrial power production in 1984. More than 81 percent of installed capacity at thermoelectric power plants in the industry are produced by 103 units with a nominal capacity of 100 MW or more. Reliable operation of these plants is crucial for the failure-free work of turbine generators in industrial energy production.

Turbine generators of 100 MW and greater capacity (with a total power output of 19,082 MW) have been manufactured by three factories: Dolmel, 12,222 MW (64 percent); Elektrosila, 5200 MW (27.3 percent) and Elektrotiazhmarsh, 1400 MW (7.3 percent).

The Basic Factors of Failure-Free Operation of Turbine Generators

Turbine Generators of 120 MW Output Capacity

New designs have been developed to prevent faults due to unwinding both in the rotor and stator. Most frequent faults in the stator included the loosening of the nuts on the bolts (also called pins), fixing the head parts of the winding, as well as the attrition of the insulation of pins and adjacent parts of the winding wire.

The new design prevents the loosening of bolts and eliminates this kind of failure. Damage to insulation at the contact with the fixtures of the winding and with the pins, however, has persisted, sometimes leading to generator failure. When segmental rings fixing the winding were replaced by full rings

and when pins were eliminated and replaced by binding made of a Torlen tape, the failures of this generator component were prevented.

Table 1. Number and Nominal Output of Generators and Industrial Power Production (as of Dec 31, 1984)

<u>Nominal output, MW</u>						
<u>Turbine generators</u>	from 190					
	<u>under 80</u>	<u>to 130</u>	<u>200</u>	<u>360</u>	<u>500</u>	<u>Total</u>
No. of generators	148	34	63	4	2	251
Total power output, MW	4,426	4,042	12,600	1,440	1,000	23,508

<u>Nominal output, MW</u>				<u>Total</u>
<u>Hydro-generators</u>	<u>under 20</u>	<u>from 20 to 100</u>	<u>over 100</u>	
No. of generators	242	16	8	266
Total power output, MW	301	526	1,180	2,007

In the rotor, failures have been observed at two sites:

- under the fan at the contact of the wires conducting the current to the rotor winding (the contact between the components placed in grooves and the component in the opening along the axis of the shaft), contacts were often broken;
- on the conducting wires (between the contact with the inner coil and the radial part of the conducting wire) damage was caused by friction of the wires against the metal inset.

In the late 1970's, the following changes were introduced into the design of this generator assembly:

- the contacts of conducting wires in the passage from the groove to the opening along the shaft axis (under the fan) were reinforced by the use of specially hard (silver) alloy for soldering;
- insulation inserts have been introduced between the fixture rings to avoid the movement of these rings.

These changes were introduced in 1976 and improved the performance of the TGH-100 turbine generator, which is now at a satisfactory level.

Since these machines operate for a long time and the insulation of windings wears, a program for ongoing rewinding of stators has been developed. The windings with bituminous insulation are replaced with modern thermally hardened insulation types. Lately, there has been an increasing need for repair of the inset between the generator and the exciter. In such cases, it has been decided to replace the mechanical converter and the exciter with a static tyristor system.

Turbine Generators of 200 MW

The Dolmel factory has undertaken since the early 1970's to modernize the turbine generators of 200 MW. As a result, a new design has been created of elastic suspension for the stator core (using elastic suspension rods). Two-chamber coil seals are used for the shafts with hydraulic pressure, a modernized design of the exciter subassembly and the use of Teflon bindings for distillate conduits to stator windings and thermally hardened insulation for the stator wires.

In the practice of generator use, several changes have been introduced to reinforce the front connections of the stator windings.

As a result of modernization of faulty elastic suspensions of stator core, most generators now are equipped with elastic suspension rods wrapped in tape. These tapes are often loosened or even broken during the operation, as signalled by a higher pitch of the sound produced by a working generator. In view of the increased frequency of faulty generator blades, the reblading of stators should be accompanied by the introduction of new types of separate suspension.

The use of mica blocks for rotor rings has been practiced on a limited scale due to shortages of mica. The power industry is modernizing this assembly by using commutator micanite for this component.

In most generators, the oil seal of rotors has been modernized. Some generators, for instance at the Ostroleka electric power plant, still operate with old types of seals with springs. Efficient maintenance of these units has made it possible to abstain from their modernization.

One of the problems that has been resolved recently was the breakage of basic conduits in stator windings causing leakage of distillate--despite the application of higher hydrogen pressure than the distillate pressure. The use in new stator windings of copper conduits will eliminate this kind of failure. An important new development was the introduction in modernized units of water chambers, which, among other things, prevents overheating of the conduits.

Turbine Generators of 360 MW

So far, the operation experience with these units has been positive. Initially, there were several instances of failure of insulators and oil seals

of the rotor. The former problem has been resolved, although the oil seals still require an improvement of their maintenance regimes. These are new designs of oil seals which are of the high-precision variety and require accurate compliance with the requirements of specifications as to their dimensions and oil quality.

Reliability of Turbine Generators

Three indicators were used to investigate the reliability of turbine generators in Poland: failures, emergency stops and availability.

The indicator of failures in this group of machines is defined as the ratio of the number of emergency failures that occurred in that group of machines during the year to the number of installed units in the group.

The emergency stoppage indicator is measured as the ratio of the number of hours of emergency idling of machines in the group during the year to the total number of operative hours plus the number of emergency stoppage hours.

The availability indicator for this group of machines is defined as the ratio of the total number of operation hours and the number of reserve hours to the total number of hours in the year (8760 hr) and the number of installed machines.

Research and Development Required by Operation Needs

This work must be mainly of a diagnostic character and will make use of the existing investigative methods, as well as the development of new techniques.

Studies of the workloads of the generators TGH-120 at lower hydrogen pressures have indicated that when the pressure dropped to 0.25 MPa, the generator could operate in the entire workload range. Research is also continuing on the performance of oil seals, which involves the continuous control of oil pressure and the flow of seal oil. These studies are conducted on a specially equipped generator.

Turbine generators TWW-200-2 are subjected to the following studies:

1. The tensometric control of the belts and suspension units of stator core; the study includes the detailed measurement of the distribution of pressures and regulation of tape tension. The initial tension of steel tapes varies from 160 to 180 MPa. Twelve generators have been equipped with this system.
2. Vibroacoustic evaluation of the elastic status of stator core suspensions, the attachment of a water cooling system, gas conduit pipes, etc. The method is based on comparing the data of measurement in different states of machine workloads with basic characteristics obtained on new or repaired machines. The tests are conducted on virtually all generators of 200 MW.

Table 2. Failure Rate, Emergency Stoppage and Availability of 200 MW Turbine Generators in Industrial Power Production, 1982 and 1984

<u>Producer</u>	<u>Failure rate, %</u>		<u>Emergency stoppage rate, %</u>		<u>Availability rate, %</u>	
	<u>1982</u>	<u>1984</u>	<u>1982</u>	<u>1984</u>	<u>1982</u>	<u>1984</u>
Dolmel	73	245	1.25	4.10	79.2	81.0
Elektrosila	147	310	1.96	3.20	79.8	84.8
Elektrotiaz- masz	285	385	0.60	5.15	83.2	82.6

3. Control of vibrations of stator cores and elastic suspension units. Based on the data collected in the observations on Polish machines, as well as from the world literature, it has been determined that the workloads of the generators at which the double amplitude of stator core vibrations of a frequency of 100 Hz is less than 30 μm are acceptable. This is used as a criterion in determining the range of workloads when studying the vibrations of the stator. Four turbine generators are equipped with vibration sensors.

4. Measurement of the vibration of winding wires of the stator in front and slot parts. The purpose of these studies is to evaluate the strength of attachment of the front connections and the slot wires. The following values of double radial vibration amplitudes for a frequency of 100 Hz are taken to be acceptable:

- up to 90 μm for the front connections and
- up to 40 μm for the slot.

Six turbine generators are equipped with control devices.

For turbine generators of 360 MW, the basic characteristics have been obtained as a result of vibroacoustic and thermal studies. These characteristics will be used to evaluate the technical condition of machines in operation.

Currently, a new diagnostic method is being developed for evaluating the condition of the stator winding insulation during the work of the generator. This method makes measurements of current with frequencies from 0.01 to 10² mHz at the generator grounding. There are also attempts to utilize the known impedance-phase (frequency) characteristics to evaluate the operative condition of generators.

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POLAND

NEW PORTABLE OIL CLEANING MACHINE

Warsaw PRZEGLAD MECHANICZNY in Polish No 9, May 85 p 22

[Article by MZ: "Portable Machine MK 2.5 for Oil Cleaning"]

[Text] The Spomasz Factory of Food Industry Machine and Equipment in Puławy last year started the serial production of the MK 2.5 machine, which cleans oil of mechanical impurities. The machine has been designed by the Educational-Industrial Center of Vehicle and Machine Operation, Higher Engineering School at Radom. The prototype series (produced in late 1984) was tested at several industrial enterprises, including the Lower Silesian Metal Works in Nowa Sol, the Metal Works at Radom and Training Workshops at the Tobacco Factory in Radom. The results were positive.

The use of the MK 2.5 machine reduces the failure rate of hydraulic systems and prolongs their service life. The system can be used either in a closed circuit as a component in the hydraulic assembly of a machine tool (operating in an on-line mode) or as an autonomic unit separate from the machine tool.

A series of filters is used in the MK 2.5 (net, paper and metal filters), with the filtration purity from 100 to 5 μm . The unit incorporates a gear pump.

The net filters placed under the pump are not replaceable. They are periodically rinsed (washed) to remove the accumulated slurry. The paper filters are regularly replaced. The periodicity of filter change is determined by the pressure, as indicated by a gauge installed in front of each filter.

The unit is simple in maintenance and requires no monitoring when used in closed circuit with the machine tool.

Main features of the MK 2.5: flow rate of 2.5-3.0 dm^3/min ; cleaning efficiency of 98 percent; oil viscosity of approximately 100 cSt; filtering quality of 5 μm ; power of 0.75 kW; power source of 380 V; weight 35 kg.

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POLAND

MERA-KFAP MEASUREMENT TECHNOLOGY PLANT PROFILED

Warsaw POMIARY AUTOMATYKA KONTROLA in Polish No 3, Mar 85 p 88

[Article by WB: "The 35th Anniversary of Mera-KFAP Enterprises"]

[Text] The Krakow Factory of Measurement Equipment [Mera-KFAP] is a multi-plant enterprise operating in the framework of the Association of Manufacturers of Information, Computer and Automation Equipment and Measurement Instruments [Mera, Warsaw].

The nomenclature of products includes:

--information and computer articles and

--measurement and control equipment with elements of automation.

The Krakow factory has been producing precision measurement and control instruments, automation equipment and peripheral devices for 35 years.

Mera-KFAP in Krakow was organized in 1949 on the basis of a number of small service units which provided maintenance repair of precision measurement and control equipment imported from other nations. Gradually, the expansion and modernization of the plant resulted in the creation of a multiplant enterprise which consists of three factories: the main organization at Krakow and the subsidiaries at Limonowa and Tarnow, with a total employment of approximately 2000 highly skilled specialists, including 231 college graduates and 1327 people with general high school, vocational or technical educations; 29 percent of the employees are women.

The existing production complex was built in 1960 and modernized in 1979. It is equipped with modern machinery. The enterprise has its own pressure casting plant in Limanowa.

The development of the organization is based on its own technical design and development facility, and research and development center, employing almost 500 people, as well as cooperation with a large number of colleges and universities, mainly in Krakow, which is one of Poland's major scientific centers.

In the past 15 years, modern licenses from advanced Western countries have been introduced, including the license for a memory unit on floppy disk purchased from the French firm Logabax. The following groups of products have been developed and put into manufacture:

--control and measurement equipment with an emphasis on instruments for measurement of temperature, flow rate and humidity;

--elements for pneumatic automation, including electropneumatic converters, homeostats and level and flow converters;

--computer peripheral devices which in 1984 amounted to more than 50 percent of total output; these include memory units on floppy disks, data storage and processing systems, eight-bit personal microcomputers and tape readers.

The output has been growing at an average rate of 10 percent. About 50 percent of the products are intended for export either directly or as an element of complex export by other Polish companies. The principal customers are the USSR, FRG, Sweden, Czechoslovakia, Hungary, Rumania and Switzerland.

All the items of the nomenclature of products are exported, but the bulk consist of computer equipment, especially tape readers and floppy disk memories.

For years, Mera-KFAP has been participating in cooperative projects under the aegis of the CEMA, mainly in the supply of floppy disk memory units, data storage and processing devices and personal microcomputers. These products are based on Logabax license for floppy disk memory unit PLx45D, purchased and introduced in 1977.

On the basis of this license, the enterprise has developed the production of various types of memory, data storage and processing units, type PSPD90 and eight-bit personal microcomputer MK4501.

The future development will include the production of new memories on floppy disk ED502 (5½") and ED803 (8") with two-sided double density recording, as well as microfloppies and 16-bit personal computers.

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POLAND

DOMESTICALLY REFINED INDUSTRIAL LUBRICANTS PROFILED

Uses of 'Glifol' Oils

Krakow NAFTA in Polish No 5, May 85 pp 162-166

[Article by Antoni Pasierb, Academy of Mining and Metallurgy, Krakow, Tadeusz Miedzybrodzki, Nonferrous Metals Plant, Szopienice, and Roman Zabkowicz, Oil Refineries, Gorlice: "Domestically Refined Industrial Processed Oils Used in the Rolling of Nonferrous Metal Strips"]

[Excerpts] Summary. The article discusses the use of industrial process oils in the rolling of aluminum strips. The requirements to be met by oil used in the rolling process are reduced to two basic functions: it must reduce the friction at the roller-metal contacts, and it should provide a proper vehicle for outflux of heat generated during the rolling process. In addition to these requirements, the oil must provide the appropriate surface for the rolled material, be easily removable from the strip surface, be physiologically neutral, leave no stains after annealing and possess a physical and chemical stability. These requirements constitute a complex of industrial problems to be resolved in the production of oils used in rolling. Oils of the Glifol type, manufactured by Polish refineries, meet these requirements.

Selection of Polish Industrial Process Oils for Cold Rolling of Aluminum Strips and Foil

The research proceeded from a detailed analysis of the process used for rolling of aluminum strips and foil by Polish manufacturing plants, as well as analysis of the technical features of Polish petrochemical plants. The results of these studies have been reported in publications. On the basis of characteristics of imported oils, a series of alternative Polish oils have been typified.

First, the cooling capacity of oils and their susceptibility to staining of metal strip after annealing have been tested. The tests were conducted on

specially designed installations that have been described in earlier publications. Systematic studies of oils made it possible to select a fraction with a required viscosity, as correlated with the rolling speed, the best cooling capacity and the least susceptibility for leaving stains on strip surfaces after annealing.

The next part of the study was the systematic investigation of the compositions of surfactant materials. The testing materials included butylstearane, lauric acid and lauryl alcohol. The objective was to determine the practical efficiency of the combinations and find the optimum composition with regard to the ingredient and its content in the oil. The evaluations of the efficiency of additives were based on a recording of elongation (bending) in a single-time passage of the rolled strip with a constant setting of the rollers and using tensiometric measurement of the metal pressure against the roller and the rolling moment.

The measurement methods, the studies and the results have been described previously. For each of the specimens of the lubricant with different types and contents of surfactant additives, the friction coefficient was determined on the basis of an original method described earlier. As a result of laboratory studies, the industrial process oil recipes were developed for various industrial applications.

For cold rolling of aluminum strips in thickness ranges of 0.2-10 mm, the types of lubricants, consisting of two oils with viscosities of 5.0-8.0 cSt at 50°C, with addition of lauryl alcohol and special additives, were selected. These oils, with brand names Glifol 5 and Glifol 7, can be used as equivalent substitutes for oils that have been imported until now.

An important problem in the use of lubricants in cold rolling of strip and foils is the leakage of hydraulic oil into the industrial process oil. The hydraulic oils commonly used in the industry have a tendency to create a bronze stain after the strip annealing, especially at temperatures of 300-380°C. The leaks of hydraulic oil inevitably lower the surface quality of the strip and foil, sometimes causing the scrapping of large batches of rolled material. This calls for selection of hydraulic oils with special requirements with regard to staining to be used in cold rolling machines. A Polish substitute for imported oils has been developed for one of the aluminum producers. The hydraulic oil Glifol 16 also displays a low susceptibility to staining, while meeting fully the specifications of the hydraulic systems of rolling mills.

The production of Glifol oils was begun in 1973 by the Oil Refineries at Gorlice, which fully satisfies the demand of the Polish aluminum processing plants. In 1983, studies were initiated towards the selection of Polish surfactants to make this industry totally independent of foreign imports.

As a result of industrial tests, it was possible to use C₁₂-20 alcohols as substitutes for imported lauryl alcohol.

Table 1

Tablica 1

1) Własność		Glifol 2	Glifol 5	Glifol 7	Glifol 16
2) gęstość w 20°C	g/cm ³	0,780-0,820	0,800-0,815	0,830-0,845	—
3) lepkość kinematyczna w 20°C	mm ² /s	2,0-3,0	2,6-3,0	6,0-7,5	17,0-22,0
4) lepkość kinematyczna w 50°C	mm ² /s	—	—	115	180
5) temperatura zapłonu (t. o.)	°C	80	85	—	—
6) destylacja normalna:	—	—	—	—	—
7) — początek destylacji	°C	195	—	—	—
8) — 5% przedestylowane	°C	—	220	225	—
9) — 50% przedestylowane	°C	225	—	—	—
10) — 95% przedestylowane	°C	—	280	350	—
11) — koniec destylacji	°C	280	—	—	—
12) zawartość węglowodorów aromatycznych	% obj.	15	25	25	—
13) zawartość siarki	% wag.	0,13	0,13	0,15	—
14) liczba kwasowa	mg KOH/g	0,05	0,06	0,08	0,05
15) korozja w 50°C w 3h na płytach Cu i stali	20) wytrzymałość	—	—	—	—
16) korozja na płytach z Cu i Al w 100°C	20) wytrzymałość	—	—	—	20) wytrzymałość
17) temperatura krzepnięcia	°C	—	—	—	25
18) pozostałość po spaleniu	%	—	—	—	0,005
19) pozostałość po koksowaniu	%	—	—	—	0,03

Key:

1. Characteristic
2. Density at 20°C, g/cm³
3. Kinematic viscosity at 20°C, mm²/s
4. Kinematic viscosity at 50°C, mm²/s
5. Ignition temperature, °C
6. Normal distillation, °C
7. Beginning of distillation, °C
8. Distillation 5 percent, °C
9. Distillation 50 percent, °C
10. Distillation 95 percent, °C
11. Complete distillation
12. Content of aromatic hydrocarbons, vol. in percent
13. Sulfur content, wt. in percent
14. Acid number, mg KOH/g
15. Corrosion at 50°C for 3 hr on copper and steel plates
16. Corrosion on copper and aluminum plates at 100°C
17. Solidification temperature, °C
18. Residue after incineration, percent
19. Residue after coking, percent
20. Resistant

Lately, tests have been started on the application of Glifol 2 oil as a lubricant in the production of polished brass wire and Glifol 7 oil for cold rolling of thin strips of copper alloys on a quarto mill and Sundwig multiroller mill (instead of W-12 lubricant used before). Industrial tests have confirmed the applicability of Glifol 2 and Glifol 7 for cold processing of copper alloys. Table 1 summarizes the characteristics of Polish industrial Glifol oils, manufactured by Gorlice Oil Refineries.

New Tinplate Rolling Lubricant

Krakow NAFTA in Polish No 5, May 85 pp 167-170

[Article by Wladyslawa Grabowska, Institute of Petroleum Technology, Krakow:
"A Domestically Produced Lubricant for Tinplate Rolling"]

[Excerpt] Summary. The article discusses the requirements for lubricants used in tinplate rolling. Against this background, the industrial processes are discussed which are used to manufacture Polish lubricant at the Institute of Petroleum Technology as a substitute for imported palm oil.

The lubricant commonly used in tinplate rolling is palm oil, consisting of a mix of glycerides of fatty acids, mainly palmitic, stearic and oleic. The use of palm oil dates back to 1930, when it was utilized for the first time on a five-unit mill. Since then, this oil has been considered irreplaceable, despite certain drawbacks such as susceptibility to aging, staining after annealing and high cost of importation.

As the rolling mill designs were improved with time, the operation speeds accelerated, and against the background of increasing output of steel and decreasing availability of palm oil, research was initiated to find lubricants that could be substitutes for palm oil. Publications began to appear indicating other fatty materials that could be used as such substitutes. The authors of those publications compared the features of various fatty raw materials with palm oils and noted similarities in the range of properties studied. For example, Hirai reported on the properties of friction coefficients obtained in tests on quarto mill which confirmed that the friction coefficients of other fats are not inferior to those of palm oil. Hirai assumed that the friction coefficients were associated with the chemistry of lubricants. According to him, the chemical properties determine the viscosity and temperature characteristics and the behavior of the material under high pressures in the roller mill hearth.

In practice, palm oil and its substitutes are used in the rolling process as ingredients of a shortlived water mix. The mix must be sufficiently stable during the time of rolling. After the process, the ingredients should be easily separable and the oil remaining on the strip easily removable by electrolytic cleansing.

These application properties and requirements for high-quality lubricants, as well as the availability of domestic raw materials, were taken into account in studies aimed at finding a replacement for palm oil. The research was conducted by the Institute of Petroleum Technology with the cooperation of the Lenin Metalworks and the Iron Metallurgy Institute.

The Polish substitute for palm oil was developed for the industrial processes at the Lenin Metal Works for rolling of tinplate. Since 1959, when the five-unit mill was put into operation, palm oil had been used there. This oil since 1969 was replaced by an imported substitute of palm oil, which has been employed successfully until a domestically produced substitute, Laminol-PT, became available.

In studies on Polish substitutes for palm oil, four-ball testing units and Timken equipment were used to investigate the lubricant properties. The former was used to determine the consumption properties, and the latter to measure the resistivity of lubricant film and friction coefficient. The utilization properties were also tested in regard to various special application conditions of palm oil, namely, the measurement of the defatting time in the rinsing bath, similar to that used in the industry, as well as the measurement of deemulsification time after homogenization of the lubricant with water. Later, after some of the formulas of domestic substitutes for palm oil were found to have a tendency to form a constant-density emulsion, additional tests were introduced to measure so-called susceptibility to churning. After studies of the consumption and lubricant features, tests were performed for the selected types of oils at the Institute of Iron Metallurgy on a duo mill 260 x 360 mm with the rolling speed of 2.45 m/min, to determine the industrial properties of lubricants according to the method developed by the Institute.

These tests, as well as literary data, suggested the use, as basic components in the palm oil substitute, of natural fat ingredients, mainly of an animal origin. These raw materials have features similar to palm oil and comparable physicochemical characteristics. In addition, the fatty acids comprised in the animal fat glycerides, similar to palm oil, have a simple-chain structure with carbon chain lengths mainly in the range of C₁₄-C₁₈ and a content of unsaturated acids with more than one double bond. The composition of fatty acids in the palm oil and in animal fats and their properties have been summarized. These data refer to products of specific batches subjected to analysis.

The lubricant properties of palm oil and animal fats were investigated in a four-ball testing unit and in Timken equipment. The following results were obtained:

	<u>palm oil</u>	<u>lard</u>	<u>suet</u>
four-ball tester; operation time 1 hr, with load of 39.2 daN	0.80	0.70	0.60
Timken tester; load 3.56 daN load 4.45 daN load 6.67 daN	OK OK SC	OK OK SC	OK OK SC
friction coefficient for load 3.56 daN	0.91	0.98	0.96

Studies of lubricant properties of mixes which, in addition to animal fats, contained other components such as mineral oil, liquid vegetable oils (such as rape oil), were performed on friction machines, as well as on a laboratory mill used to test industrial properties. The results showed no significant differences among the mixes tested. The differences in the mill test results among the individual operations were insignificant, so that the mixes could be recognized as equivalent in this respect. However, friction coefficients measured in the Timken equipment suggested that the presence of mineral oil somewhat reduced the lubrication quality.

This difference in the results of the studies of lubricant properties and industrial properties could also stem from the presence of condensing and homogenizing ingredients of fats and oils, as well as additives and especially emulsifiers, which had different effects in different tests performed on the mixes. Indeed, each combination of basic ingredients requires a different composition and quantity of additives used to attain a required density, homogeneity, deemulsification, defatting, etc.

Table 5. Comparison of the Properties of Polish Lubricant Laminol PT With Those of Foreign Oils Used in Tinplate Rolling

	Laminol PT	Imported oils		
		oil A	oil B	oil C
Viscosity at 100°C, mm ² /s	9.0	8.7	3.6	8.6
Ignition temperature, °C	240	240	240	239
Solidification temperature, °C	30	22	24	23
Saponification number, KOH/g	188	190	194	198
Acid number, mg KOH/g	3	19	23	28
Iodine number, g J2/100 g	47	53	49	74
Titer, °C	40	36	38	31
Test in four-ball unit for 1 hr, load 39.2 daN; flaw diameter, mm	0.60	0.50	0.70	0.60
Timken tests:				
load 3.56 daN	OK	OK	OK	OK
load 4.45 daN	OK	OK	-	OK
load 6.67 daN	SC	SC	SC	SC
Friction coefficient at load 3.56 daN	0.094	0.095	0.088	0.089
Deemulsification time, s	130	64	300	20
Defatting time, s	120	120	120	140

It has been determined that Polish oil for tinplate rolling will consist of a composition of animal fats with anticorrosive, antioxidative, homogenizing and emulsifying additives, mainly with a low degree of activity, in particular, fatty acid esters with polyhydroxyl alcohols. Later, an additive preventing churning of oil ingredients with water was introduced.

The industrial introduction of Polish palm oil substitutes was preceded by a two-stage operation test on five-unit tinplate rolling mill at the Lenin Metal Works, where a total of some 18,000 tons of tinplate were rolled, including 14,000 tons of white tinplate.

The properties of Polish Laminol-PT compared with other palm oil substitutes used in tinplate rolling, as utilized by the Lenin Metal Works, are given in Table 5. The data in the table refer to particular batches of oils (indicated by letters) and are approximate, because the characteristics of the individual batches and oil types sometimes varied, although within acceptable allowances.

In industrial tests, the Polish substitute of palm oil, Laminol-PT, was found to be a perfectly suitable lubricant when used in the lubrication-cooling system of a five-unit rolling mill for manufacturing white tinplate.

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BRIEFS

ELECTRON ACCELERATOR METERS--Fantom is the name of a new measurement instrument produced by Zielona Gura Interatominstrument Service Enterprise, which is to be used with electron accelerators used for radiologic treatment of cancer. Interatominstrument has prepared the design and manufacturing documentation for the electron accelerator meter. The first 10 Fantoms produced by the factory have been purchased by the Institute of Nuclear Problems at Swierek. [Text] [Warsaw TRYBUNA LUDU in Polish 13-14 Jul 85 p 2] 9922

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